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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/529,257	04/11/2000	MASAKAZU ONIZUKA	1684/48707	5277

7590 04/28/2003

CROWELL & MORING LLP
INTELLECTUAL PROPERTY GROUP
P. O. BOX 14300
WASHINGTON, DC 20044-4300

EXAMINER	
LEUNG, JENNIFER A	
ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 04/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

A 9-8

Office Action Summary	Application No.	Applicant(s)	
	09/529,257	ONIZUKA ET AL.	
	Examiner	Art Unit	
	Jennifer A. Leung	1764	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 January 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *10 January 2003* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. Applicant's Amendment filed on January 10, 2003 has been received and carefully considered. The changes submitted to the Specification and Drawings are acceptable. Claim 7 has been cancelled. Claims 1-6 remain active.

Claim Objections

2. Claim 2 is objected to because of the following informalities: "said branch pipe branches" (line 2) should be changed to -- said branch pipes branch -- for proper grammatical form and agreement. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamaru et al. (JP 08-000950).

With respect to claim 1, Tamaru et al. disclose a wet gas desulfurizing apparatus for absorbing the sulfur oxides of an exhaust gas with an absorption liquid ([Sections 0002-0003]), said apparatus comprising a branch pipe **12** of diameter D ([Section 0016], FIG. 3) for circulating an absorption liquid, said pipe **12** extending into a collection tank **4** and having an end which discharges the absorption liquid into the collection tank (FIG. 1). Furthermore,

Tamaru et al. disclose an air-blowing pipe **14** for injecting air into the pipe **12**, said air-blowing pipe having an end inserted into the pipe **12** at an insertion point (at mixing point **13**). In view of the newly added claim limitations, Tamaru et al. disclose the branch pipe **12** extends through a wall of the collection tank **4** (see FIG. 1) in order to discharge the circulating absorption liquid into the absorption liquid in the collection tank **4**.

Tamaru et al. are silent as to the air-blowing pipe **14** being inserted into the branch pipe at an insertion point located between 3D and 10D from the discharge end of the pipe **12**. However, Tamaru et al. further disclose that generating a "foam" by mixing the absorption liquid and air prior to injection improves the diffusion of air in the collection tank and "it becomes possible to make it blow in into a liquid as a detailed foam also of a mass of gas," interpreted to mean that the foam is still present in the liquid upon reaching the discharge end of pipe **12** (machine translation; [Section 0008]).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to insert the air-blowing pipe into the branch pipe at an insertion point between 3D and 10D from the discharge end of a branch pipe in the apparatus of Tamaru et al., on the basis of suitability for the intended use and absent showing unexpected results thereof, because inserting the air-blowing pipe at a point of sufficient distance upstream of the discharge end allows the air and fluid to be well mixed in the discharge pipe prior to injection, and when compared with the case of gas injection without prior mixing, the generated "foam" mixture more easily diffuses into the collection tank, allowing better distribution of the gas in the liquid, as taught by Tamaru et al. In any event, shifting location of parts was held to have been obvious in absence of showing any unexpected result, *In re Japikse,* 181 F.2d 1019, 1023, 86 USPQ 70,

73 (CCPA 1950), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233.*

With respect to claim 4, Tamaru et al. disclose that the interior diameter **d** of the air-blowing pipe **14** may be changed with changes in the flow rate through pipe **12**, and further disclose a specific diameter **d** in the range of 0.3D to 0.7D (substantially the recited range of 0.4D to 0.7D), where D is the diameter of pipe **12**. Numerical ranges that overlap prior art ranges were held to have been obvious. *In re Wertheim 191 USPQ 90 (CCPA 1976); In re Malagari 182 USPQ 549 (CCPA 1974); In re Fields 134 USPQ 242 (CCPA 1962); In re Nehrenberg 126 USPQ 383 (CCPA 1960).*

4. Claims 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamaru et al. (JP 08-000950) in view of Hiroo et al. (JP 07-031841).

Tamaru et al. further disclose, "although the fluid from the mixed section was made to blow off from one place from a circulation pipe to a liquid pool tank, you may make it spout from two or more places," which is best interpreted to mean that the apparatus may comprise a plurality of branch pipes (machine translation, Section [0035]). Tamaru et al. further disclose a distribution pipe **7** downstream of a circulation pump **5** which connects the collection tank **4** and a spraying means **6** for spraying the absorption liquid into the combustion exhaust gas (FIG.1; Section [0018]). However, Tamaru et al. are silent as to whether the branch pipe **12** may branch from the distribution pipe **7**. Hiroo et al. teach an apparatus for the desulfurization of combustion gas, wherein a branch pipe **8**, **12** branches from a distribution pipe **5** downstream of a single circulation pump **4** which connects the collection tank **2** and a spraying means **6** for

spraying an absorption liquid into the combustion exhaust gas (FIG. 1; Abstract). It would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tamaru et al. according the Hiroo et al., i.e. such that the branch pipe **12** branched from the distribution pipe **7**, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since such an arrangement would allow for a single circulation pump for distributing the liquid to both the branch pipe and spraying means (opposed to the two separate pumps **5** and **11** as illustrated in Tamaru et al.).

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tamaru et al. (JP 08-000950), as applied to claim 1 above, and further in view of Henry III (U.S. 3,825,286) and Koster (U.S. 3,005,369).

Tamaru et al. are silent as to the air-blowing pipe **14** configured as a semicircular trough facing the downstream towards the collection tank. Henry III teaches a pipe structure (FIG. 4) comprising a primary pipe **41** (i.e. branch pipe) and a secondary pipe **47** (i.e. air-blowing pipe) for introducing separate paths of fluids into a single path, wherein the secondary pipe **47** may be configured to face the downstream side during fluid flow (flow towards surface **53**). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide the pipe structure to the apparatus of Tamaru et al. because the pipe structure represents a quick and easy means for creating a piping system using readily available parts, thereby avoiding complex valves and fittings, and may be applicable to thick or viscous fluid flows (i.e. slurries), as taught by Henry III (column 1, lines 1-31).

In addition, the collective teachings of Tamaru et al. and Henry III are silent as to the secondary pipe **47** being configured as a semicircular trough. Koster teaches a tubular assembly

(FIG. 1), substantially the pipe structure of Henry III, comprising a secondary tube **12** (i.e. air-blowing pipe) branching from a primary tube **11** (i.e. branch pipe), wherein the tubes **11**, **12** may be configured as a notched end or semicircular trough (FIG. 3). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the air-blowing tube to be a semicircular trough in the modified apparatus of Tamaru et al. because the semicircular trough allows a secondary tube, upon insertion into a primary tube, to conform to the contour of the primary tube to which it is connected in angular relation, thereby creating a snug or close fit, as taught by Koster. In any event, it has been held that changes in shape involves only ordinary skill in the art. *In re Dailey* 149 USPQ 47, 50 (CCPA 1966); *Glue Co. v Upton* 97 US 3, 24 (USSC 1878).

6. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamaru et al. (JP 08-000950), as applied to claim 1 above, and further in view of Von Berg (U.S. 5,403,522).

With respect to claim 5, Tamaru et al. are silent as to the branch pipe **12** comprising an orifice upstream from the air-blowing pipe **14** insertion point **13** (FIG. 3) wherein the insertion point **13** is located in a region of negative pressure created by the orifice, said region located downstream of said orifice. However, Tamaru et al. additionally disclose that the piping structure at the insertion point **13** is not critical as long as a turbulent flow is generated and air may be introduced into the turbulent flow ([Section 0016]). Von Berg teaches an apparatus for mixing a liquid and a flowable treating agent (i.e. oxygen, air) comprising a branch pipe **32** comprising an orifice **78** upstream from an air-blowing pipe **66** insertion point **56** (see FIG. 2), wherein the insertion point **56** is located in a region of negative pressure created by the orifice **78** (Abstract; column 1, lines 11-27; column 2, line 64 to column 3 line 2). It would have been

obvious for one of ordinary skill in the art at the time the invention was made to provide the orifice to the apparatus of Tamaru et al. because the orifice, placed upstream from the air-blowing pipe, would enable air or other gaseous treatment agents to be drawn by suction into the branch pipe for turbulent mixing with the absorption liquid, thereby improving the entrainment of the air in the liquid, as taught by Von Berg. Furthermore, as evidenced by Von Berg, the use of such mixing apparatus is conventional knowledge in the art

With respect to claim 6, the collective teachings of Tamaru et al. and Von Berg are silent as to the orifice **78** comprising a diameter of about 2/3 to 3/4 that of the branch pipe. Von Berg does teach, however, that the orifice **78** is relatively smaller than the diameter of the conduit **32** (FIGs. 2-7). It would have been obvious for one of ordinary skill in the art at the time the invention was made select an appropriate orifice diameter, i.e. a diameter of about 2/3 to 3/4 that of the branch pipe, in the modified apparatus of Tamaru et al., on the basis of suitability for the intended use and absent showing unexpected results thereof, because an orifice of diameter smaller than the branch pipe diameter is necessary for generating the low pressure turbulent mixing zone, as taught by Von Berg. Furthermore, it has been held that changes in size involve only ordinary skill in the art, *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233*.

Response to Arguments

7. Applicant's arguments with respect to claim 2 have been considered but are moot in view of the new grounds of rejection, as necessitated by amendment.

8. Applicant's arguments, filed January 10, 2003, with respect to claims 1 and 3-6, have been fully considered but are not persuasive.

Applicants argue, "Tamaru discloses that air can be mixed for generating a 'foam', but do not disclose how to generate the 'foam' efficiently," and "Tamaru's silence on this limitation cannot support the conclusion that such would have been an obvious modification at the time the invention was made to a person having ordinary skill in the art." (page 8, second paragraph).

The Examiner asserts that despite the silence as to the specific range of 3D to 10D for the insertion point of the air pipe **14** to the branch pipe **12**, such limitation remains obvious in the apparatus of Tamaru et al. As commented above in claim 1 and discussed presently, Tamaru et al. disclose "the inertia force at the time of jet is strong, a foam diffuses easily in a liquid. Therefore, while it becomes possible to make it blow in into a liquid as a detailed foam also of a mass of gas, it becomes possible to diffuse a foam easily in a liquid," which is best interpreted to mean that the dispersed air bubbles ('foam') are still present in the liquid upon reaching the discharge end of pipe **12** in order to enable the release of air bubbles into the liquid in the tank for diffusion (machine translation; [Section 0008]). Further support is cited in Section [0019], wherein, "a foam spreads to the long distance in the liquid pool tank 4 (lean solution) and it is distributed easily and uniformly in a lean solution." In view of Applicants comments made with regards to the Hiroo rejection which is now withdrawn (page 7, paragraph 2), "if the distance between the discharge end of the discharge tube **12** and the air mixer **9** is too long, then the dispersed air bubbles in the absorption liquid caused by the air mixer **9** will disappear before they reach the discharge end." Clearly, this is not the case in the apparatus of Tamaru et al., since the

air bubbles or 'detailed foam' do not disappear before they reach the discharge end. Thus, the insertion point would not be too long and would inherently lie below the specified limit of 10D.

Tamaru et al. further disclose, "since the multiphase flow which this foam mixed is returned to a liquid, even if it makes [many] a gaseous amount, there is no fear of causing cavitation." (machine translation, [Section 0008]). As defined by The American Heritage® Dictionary of the English Language, Fourth Edition, Copyright © 2000 by Houghton Mifflin Company, cavitation is the sudden formation and collapse of low-pressure bubbles in liquids. Therefore, the Tamaru et al. reference is best interpreted to mean that the air bubbles or 'foam' is stabilized, since sudden formation and collapse of bubbles is not present. In view of Applicants comments made with regards to the Hiroo rejection which is now withdrawn (page 7, paragraph 2), "If the distance between air mixer **9** and the discharge end of the discharge tube **12** is too short, then the turbulent zone will not be stabilized by the time the flow reaches the discharge end of the discharge tube **12**." Clearly, this is not the case in the apparatus of Tamaru et al., since the air bubbles exiting the branch pipe are stabilized. Thus, the insertion point would not be too short and would inherently lie above the specified limit of 3D.

Regarding remarks made with respect to claim 4 (page 8, paragraph 3), the range of 0.4D to 0.7D remains obvious, for reasons indicated in the rejection above and in view of the case law, which establishes that numerical ranges that overlap prior art ranges are obvious. *In re Wertheim 191 USPQ 90 (CCPA 1976); In re Malagari 182 USPQ 549 (CCPA 1974); In re Fields 134 USPQ 242 (CCPA 1962); In re Nehrenberg 126 USPQ 383 (CCPA 1960).*

Regarding remarks made with respect to claim 3 (page 8, paragraph 4), although Applicants argue that the mode of pipe insertion and shape of the instant invention is not

disclosed by either Henry, III et al. or Koster, Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references. As illustrated in FIG. 4 of Henry, III et al., [air blowing] pipe **47** is inserted into [branch] pipe **41**. As illustrated in FIG. 3 of Koster, a pipe **12** is configured as a semicircular trough.

Regarding remarks made with respect to claims 5-6, Applicants argue, "The claimed invention recites an orifice, not a nozzle, for the purpose of constricting the flow of the absorption liquid," (page 9, paragraph 2) and that an orifice is distinct from a nozzle, as evidenced by the JSME Mechanical Engineering Dictionary. However, the Examiner has interpreted the claim in its broadest context, and therefore the Von Berg reference remains sufficient. In particular, an "orifice" can be defined as an aperture of a tube, or an opening (Webster's Revised Unabridged Dictionary, © 1996, 1998). Furthermore, as illustrated by the Lott reference, provided as pertinent prior art in the previous Office Action, a nozzle may comprise an orifice (i.e. orifice **40** for nozzle **10**; Abstract; FIG. 5).

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is 703-305-4951. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 703-308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jennifer A. Leung
March 17, 2003

Hien Tran

HIEN TRAN
PRIMARY EXAMINER